RECLAMATION AND DRAINAGE

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One has but to consider the rapidly increasing growth in population in the United States and compare this extraordinary growth with the rapidly diminishing areas of arable land in our national domain that will make homes and support families, and to think of the centralization of the annual influx of emigrants in the busy centers, to realize that very soon every artificial means must be adopted in adding to the tillable land which now supports the people and forms the backbone of our national prosperity.

Practically all the lands in the United States that are at present ready for agriculture have passed into private ownership. The rapid increase of the population has made it necessary for the federal government to resort to irrigation of the arid lands to provide homes for the people. The wisdom of this measure cannot be overestimated. This act of Congress, passed in 1902, provides for the appropriation of receipts arising from the sale of public lands in certain states and territories for the construction of irrigation works for the reclamation of arid and semi-arid lands. Up to the present time the government has invested in irrigation projects in this manner, in thirteen western states and two territories, fifty-two million dollars.

These lands are sold to the settler at actual cost of reclamation, to be paid for in ten annual instalments. As the moneys arising from the sale of these lands are to be returned to the reclamation fund and reinvested in irrigation projects, the benefits arising from this act are far reaching. This subject is an absorbing and interesting one, and pregnant with stupendous possibilities. The drainage of swamp and overflowed lands offers reclamation possibilities of equal magnitude, and from an industrial standpoint is even more attractive.

Lying along the south Atlantic and gulf coasts, from Virginia to Texas, are millions of acres of swamp lands which serve no useful purpose, but are a serious menace to the physical health of

a large body of our population and interfere seriously with highway construction, which is necessary to social and business intercourse. A large part of this waste area is drainable by gravity at small initial cost per acre, and when we consider the length of its growing season, its proximity to the large centers of population, its water transportation possibilities, and its exceptional fertility, it readily can be seen that these swamp lands are destined to play an important part in the future development of the country.

An estimate of the swamp lands which can be won to agriculture by engineering expedients in the Southern States will be found below. These figures are only approximate, but it is believed that they lean to the side of conservatism and that data obtained by topographic surveys will considerably increase this estimate.

SWAMP LANDS—SQUARE MILES.

Virginia	900	Arkansas	6,300
North Carolina	3,800	Tennessee	1,000
South Carolina	3,400	Louisiana	12,000
Georgia	1,800	Texas	3,800
Florida	14,000		
Alabama	1,200	Total	56,200
Mississippi	8,000		

The object in preparing this table has been rather to indicate the importance of these lands to the agricultural interests of the South than to afford precise statistics. Such statistics can be obtained only when the topographic maps of each state are completed and the area of each individual unit has been computed.

To understand the causes which produce embarrassed drainage conditions involves a knowledge of the physical history of a country combined with the relations between the rainfall, the gradients by which that rainfall descends to the sea, the seasonal distribution of the rainfall, and the temperature of the district. Among the varied conditions which determine the formation of swamps, the shapes of the land, or the topography, are generally of most importance, second, the rainfall, and lastly, the temperature, which serves to affect in a measure, the dryness of the air and also the nature of the vegetation. It can therefore be seen that the formation of these swamps depends on a great variety of circumstances, and it is plain that in this brief paper we cannot go deeply into any

of these subjects, nor is it my purpose to present a treatise. However, I wish to call attention to the enormous areas of swamp and overflowed land lying along the Atlantic and gulf coasts, and extending along the rivers into the interior, from the Potomac River to the Rio Grande, and the value of these lands for agricultural uses when reclaimed by artificial drainage.

Swamps of a similar character, to some extent, are found in the region north of the Potomac, but they do not take on a conspicuous aspect until we pass southward of that stream—this for the very good reason that the surface of the country is higher as we go north and has developed a stronger topography. The streams in most cases are sufficiently incised to permit almost everywhere the ready drainage of the water, despite the obstructing effect of vegetation. Moreover, north of the Potomac the mean annual temperature is lower and the many plants which obstruct drainage in the southern states have but a scanty growth.

The drainage of swamp lands for agricultural purposes is as old as the art of agriculture. England and Ireland have engaged in wet-land reclamation for more than one thousand years. It is estimated that five per cent of the fertile lands of Great Britain were covered by swamps at the beginning of the eighth century. In Italy large areas have been freed from mosquitoes and malaria, and made productive by the restraint of the flood waters of the Po, while other large areas have been made fertile by their distribution. In Holland even greater results have been accomplished by artificial drainage. By the construction of huge dikes and the installation of pumping plants lands lying below the ocean level and formerly covered by the Haerlemmer Meer and the Zuider Zee have been converted into productive fields. In this latter enterprise Holland is at present spending millions of dollars. These drainage projects have added millions of acres to the cultivable lands of Europe, and the lands so reclaimed are now among the greatest producers of food products in the world.

Drainage of large areas, in the aggregate, has been accomplished in the southern states through private enterprise, and the results accomplished have more than justified the outlay. It is not believed, however, that individual effort can ever solve the reclamation problem, and several of the southern states, notably North Carolina, Florida, Mississippi, Louisiana, and Texas, are energetically taking hold of the question.

It is coming to be recognized as never before that the engineering problems in this connection are very broad and that both preliminary surveys and construction plans must be undertaken on a comprehensive basis. This is a long step towards the solution of the problem. It is hoped that we have nearly completed the days of wasteful expenditure for construction without exact engineering data for a basis. To proceed, in localities of limited area, with plans in which only local interests are considered and the general topographic features of the drainage basin of which they form a part overlooked, must result in injurious consequences to other interests and probably result in local complications. The boundaries of drainage units, to be successful, should be determined by the physical features of a district, and not by arbitrary limitations. Again, the problems of drainage, highway construction, improvement of natural waterways, and water-power development, are frequently so related that the solution of each must be worked out with due consideration of the others.

There are many opportunities for inland navigation along the south Atlantic and gulf coasts, and the development of these will have an important part in the reclamation of the swamps. These swamp lands when reclaimed will offer a combination of advantages such as are rarely found in any part of the world—an excellent soil; ready rail and water communication; favorable climate; with a cost for improvement less than that required to win to agriculture the arid lands in the western states.